

REMARKS

Claims 1-16, and 20-27 are pending in the present Application. Claim 1 has been amended, claim 28 has been added, claims 2 and 17-19 have been canceled, and claims 4, 6, 10-12, 14, 15, and 21-27 are withdrawn, leaving claims 1, 3, 5, 7-9, 13, 16, 20, and 28 for consideration upon entry of the present Amendment.

Amendments to Claims

Claim 1 has been amended to include a temperature limitation of 550°C or higher, and to include an added limitation to the core-shell structure of Claim 2, canceled herewith. Support for these amendments can be found in the application as originally filed on at least p. 7, line 16, p. 8, lines 20-23, and Claim 2 of the application as originally filed. No new matter has been entered by these amendments.

New Claims

Claim 28 has been added to further claim the invention. Support for this claim can be found in the application as originally filed on at least p. 7, line 16, p. 8 and lines 20-23 of the application as originally filed. No new matter has been entered by these amendments.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-3, 5, 7-9, 13, 17, 17, and 20 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent Application Publication No. 2002/0114993 (“Miyaki”) in view of U.S. Patent No. 5,916,485 (“Besenhard”). Applicants respectfully traverse the rejections.

Graham v. John Deere Co., 383 U.S. 1 (1966), set out an objective analysis for applying 35 U.S.C. § 103(a): “[The] scope and content of the prior art are ... determined; differences between the prior art and the claims at issue are ... ascertained; and level of

ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined.” Under the *Graham* analysis, to establish a *prima facie* case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Miyaki generally discloses a nonaqueous secondary battery containing a positive electrode and a negative electrode both containing a material capable of reversibly intercalating and disintercalating lithium, and wherein the positive and/or negative electrode have at least one protective layer thereon, a nonaqueous electrolyte, and a separator.

Besenhard generally discloses a method for producing electrically conductive composites from predominantly non-conductive or poorly conductive substances through the application of substrate-induced coagulation.

The present claims generally direct to a method of producing surface modified materials, specifically surface modified cathode materials for lithium batteries.

The amended independent claim 1 and the claims depend from it are not obvious over Miyaki in view of Besenhard since there is a nonobvious difference between the references and the present claims. Amended claim 1 requires “treating the resultant of step (ii) with heat at a temperature of more than about 550 °C.” Neither Miyaki nor Besenhard teaches or suggests this element.

Miyaki does not disclose or suggest the missing element, nor does the reference disclose a step that can be considered by an ordinary skill in the art to equate the step. No heating steps disclosed by Miyaki involve heating the deposit (a material produced by steps (i) and (ii) of claim 1) coated bulk material at a temperature of more than about 550 °C, which is required by the present claims. Specifically, according to Miyaki, calcining is carried out to make the amorphous oxide composite used as the electrode:

The amorphous composite oxides used in the invention can be synthesized by either a calcining process or a solution process. A calcining process is more preferred. In a calcining process, oxides or compounds of the elements shown in formula (1) are mixed well and calcined to obtain an amorphous composite oxide. Calcining is carried out preferably at a rate of temperature rise of 5 to 200 °C/min, at a calcining temperature of 500 to 1500 °C. for a calcining time of 1 to 100

hours. The rate of temperature drop is preferably 2 to 10^7 °C/min.

Miyaki, paragraphs [0078] and [0079], or for the synthesis of the positive electrode material:

The positive electrode active material can be synthesized by mixing a lithium compound and a transition metal compound(s), followed by calcining method or by solution reaction. The calcining process is particularly preferred. The calcining temperature is selected from the range in which a part of the mixed compounds may decompose or melt, for example, from 250 to 2000 °C., preferably from 350 to 1500 °C. Calcining is preferably preceded by calcination at 250 to 900 °C. The calcining time is preferably 1 to 72 hours, more preferably 2 to 20 hours. The mixing of the raw materials may be either dry blending or wet blending. The calcining may be followed by annealing at 200 to 900 °C.

Miyaki, paragraph [0429], or for drying the assembled sheet, cylindrical or angular-shaped battery:

...In a sheet, cylindrical or angular-shaped battery, the positive or negative electrode material mixture is usually applied to a current collector, dried, and compressed. ... Drying or dehydration of the pellet or the sheet is conducted by a generally used means. Hot air drying, vacuum drying, infrared drying, far infrared drying, electron beam drying, and low humidity air drying can be employed either alone or in combination thereof. The drying temperature preferably ranges from 80 to 350 °C., particularly from 100 to 250 °C. It is preferable for cycle characteristics that the water content of each of the positive electrode material mixture, the negative electrode material mixture, and the electrolyte be not more than 500 ppm, giving the total battery water content of not more than 2000 ppm. ...

Miyaki, paragraphs [0459] and [0460].

Additionally, contrary to what has been alleged by the Examiner, the drying of a sheet, cylindrical or angular-shaped battery is not the “treating the resultant of step (ii) with heat at a temperature of more than about 550 °C” required by the amended claims, and would not be considered by an ordinary skill in the art to equate to the heating step. First, Miyaki teaches the drying of the assembled battery. Further, the disclosed temperature range according to Miyaki is from 80 to 350 °C, well below the 550 °C required by the present claims. The temperature requirement “of more than about 550 °C” is not disclosed or suggested.

Besenhard does not teach or suggest the missing element. The Examiner does not

allege that Besenhard discloses this element; Applicants do not find that Besenhard discloses this element, nor do Applicants find any disclosure in Besenhard that can be considered by an ordinary skill in the art to equate this element. Therefore, the two references, alone or in combination, fail to disclose or suggest the element “treating the resultant of step (ii) with heat at a temperature of more than about 550 °C” required by the amended claims.

The Examiner has additionally alleged that the temperature range of 350 °C would produce the concentration gradient of the one or more dopant as required by the present claims. Applicants respectfully disagree. The amended independent claim 1 and the claims depend from it further require the heat at a temperature of more than 550 °C to create “a core-shell materials with the core and the shell(s) being different distinct phases,” a structure that could not be formed when heating at the temperature of 350 °C. First, according to the disclosure of the present application, this “core-shell” materials with the core and the shell being different phases can only be formed at a temperature of more than about 550 °C, because a chemical reaction between the bulk material and the deposit to form one or more new phases can only happen at 550 °C or higher. (See, p. 7, lines 20-24; p. 11, lines 14-16 of the Specification as originally filed) Second, the Examiner has alleged that the element of the concentration gradient of the one or more dopant is met by the references without providing any scientific or technical basis. Applicants submit that neither element is met by the cited references based on the present specification, the absence of any such disclosures in the cited references, and the fact that the temperature taught by Miyaki would not be able to produce such structures.

In sum, the amended independent claim 1 is nonobvious in view of Miyaki over Besenhard since the alleged combination fails to disclose or suggest all elements required by the present claims. Claims 3, 5, 7-9, 13, 16, 20, and 28 all depend from claim 1 and therefore are not obvious over the cited references. The claims are therefore patentable over the cited art and allowable to Applicants. Reconsideration and withdrawal of the rejections are respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly,

reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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